

COMPARATIVE STUDIES BETWEEN GUIDELINES AND ACTUAL PRACTICE OF SAFETY ON SITE IN PERSPECTIVE OF PPE

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ABSTRACT

Accident in construction industry still occurs even with the enforcement of safety. Workers fail to follow the proper procedures for minimizing hazard and the safety guideline in site. Personal Protective Equipment (PPE) can be significant determining factors between hazard and safety on construction site. The practice of safety guidelines in perspective of PPE with the smallest differential in adoption of actual practice contribute on the occurrence of accidents and its frequencies in Malaysia. This research aims to find out the comparative studies between actual safety on site and DOSH guidelines, determine factors why workers not follow safety guidelines and discuss method to minimize Safety issues on site so advance precaution can be taken to lessen the numbers of accidents. The scope of this research is based on a current construction project in Setapak, Kuala Lumpur area. Site based data collection entailed interview of safety officer or parties that responsible for the safety on site and DOSH officer regarding to the safety

ABSTRAK

Kemalangan dalam industri pembinaan masih berlaku walaupun dengan penguatkuasaan keselamatan. Pekerja gagal mematuhi prosedur yang betul untuk mengurangkan bahaya dan garis panduan keselamatan di tapak Peralatan Perlindungan .Personal (PPE) boleh menjadi faktor penentu yang signifikan di antara bahaya dan keselamatan di tapak pembinaan. Amalan garis panduan keselamatan dalam perspektif PPE dengan perbezaan yang paling kecil dalam penggunaan amalan sebenar menyumbang kepada berlakunya kemalangan dan frekuensi di Malaysia. Kajian ini bertujuan untuk mengetahui kajian perbandingan antara keselamatan yang sebenar di laman web dan garis panduan JKKP, menentukan faktor mengapa pekerja tidak mematuhi garis panduan keselamatan dan membincangkan kaedah untuk mengurangkan isu-isu keselamatan di laman web supaya langkah berjaga-jaga lebih awal boleh diambil untuk mengurangkan bilangan kemalangan. Skop kajian ini adalah berdasarkan kepada projek pembinaan semasa di Setapak, kawasan Kuala Lumpur. Tapak pengumpulan data berasaskan melibatkan temuduga pegawai keselamatan atau pihak yang bertanggungjawab terhadap keselamatan di tapak dan pegawai JKKP mengenai garis panduan keselamatan dan isu-isu dalam perspektif Peralatan Perlindungan Peribadi (PPE).

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LIST OF ABBREVIATIONS

PPE	Personal Protective Equipment
DOSH	Department of Safety and Health
ILO	International Labour Organization
CDM	Construction Design and Management
OSHA	Occupational Safety and Health Administration
PD	Permanent disability
NPD	Non- Permanent disability
NIOSH	National Institute of Occupational Safety and Health
OSH	Occupational Safety and Health
HSWA	Health and Safety at Work Act 1974
UK	United Kingdom (UK)

CHAPTER 1

INTRODUCTION

1.1 Research background

The Involvement of government in worker safety has gone through major changes in past 200 years. During the Industrial Revolution of the 19th century employer where seldom held responsible for the work related injuries of their employees. The common law defences of assumption of risk (the workers knew the job was dangerous), contributory negligence (the worker's action helped cause the accidents), and the fellow workers doctrine (the accident where precipitated by another worker, not the employer) gave considerable relief to employer. Thus the industrial worker often responsible for their own job-site well-being and for any injuries they might receive during the course of their employment.(Jimmie W.Hinze,1997).The number of industrial accidents reported to the Social Security Organization (SOCSO) has declined by 35 percent from 1995 to 2003. SOCSO had received 114,134 reports on industrial accidents in 1995 and in 2003, the number had reduced to 73,858 cases. However, the number of fatalities arising from industrial accidents for the same period only marginally decreased by 0.7 per cent from 828 in 1995 to 822 in 2003 (SOCSO, 2001) .Over the years, the construction industry has consistently been among those industries with the higher injury and fatality rates. (Jimmie W.hinzie, 1997).The number of construction accidents for the same period on the other hand has increased by 5.6 per cent from 4,406 cases in 1995 to 4,654 cases in 2003. In addition, the fatality rate has increased by 58.3 per cent from 60 cases in 1995 to 95 cases in 2003. The fatality rate from construction accidents are among the highest compared to the overall industry (NSTP, 2000)

By far the largest category is falls, which include people falling from one level to another, people falling at the same level and plant and material falling including a structure or part of a structure collapsing and striking, crushing or burying people. Each year 70-80% of all fatalities and 35-40% of all injuries may be attribute to this cause.

An incident is defined as an unintentional and undesirable event that may or may not result in an injury, and an incident that results in an injury or fatality is defined as an accident. This definition clearly indicates that the occurrence of a construction incident is a random event caused by such factors as window of accident opportunity, chance, and luck, which are frequently mentioned in the incident causation literature (Ramsey 1985; Sanders and Shaw 1988; Reason 1990; McKinnon 2000)

Accidents which is classified into two categories, direct (immediate) and indirect (distant) causes. The direct causes refer to causes which have an immediate effect on workers safety condition example structural failures and insufficient PPE. Nevertheless, what gives room for this unsafe condition on site depends on indirect causes such as poor organization and economic concern (Rita Yi Ma Lin & Sun Wah Poon, 2013).

Accident in construction industry still occurs even with the enforcement of safety. Workers fail to follow the proper procedures for minimizing hazard and the safety guideline in site. Even the best site management of safety cannot prevent all accident without the discipline from workers that performing the job able to fulfil and follow the right instruction in using the equipment. In this research the case study is focused on the comparative between guideline and actual practice of Safety procedures in site in perspective of PPE.

1.2 Problem statement

Accidents occurring at the construction site in Malaysia recorded a worrying increase in numbers by the Social Security Organization and with the unpredictable

accident reported this industry have captured attention and concern from both government and non-government. Based on the report recorded by DOSH top five categories of fatalities in construction site that cause hazard is falls ,electrocutions ,vehicles rollover, personal run over by vehicles and excavation caveins .The practice of safety guidelines in perspective of PPE with the smallest differential in adoption of actual practice contribute on the occurrence of accidents and its frequencies in Malaysia.

The most communities would conclude that the employers are at fault based on methods and ways these accidents occurred. Others believe it is the attitudes and recklessness of the workers themselves that caused these accidents by not following the safety guidelines. Besides safety issue always considered second behind time, quality and cost that are always as main factor. Hectic schedule that result workers careless, irresponsible attitudes and workers negligence.

1.3 Research Aims and Objectives

The aim of this research is to understand the comparative studies between guidelines and actual practice. The following are the objectives in this research

1. To determine factors why workers not follow safety guidelines in perspective of PPE
2. To propose method minimize Occupational Safety and Health issue

1.4 Scope and limitations

The scope of this research is based on a current construction project in Setapak area .Case study method is used to determine the application of Personal Proactive equipment in actual practice of safety following DOSH guideline by the workers in construction site that might contribute to the numbers of hazard in site .The case study is explanatory in context practice of safety procedures among workers in site following DOSH guidelines. This study is limited to the person that responsible for safety on site, to determine application of PPE (Personal proactive equipment) .

A visit to construction site will included in research analysis to interview the workers that involve in the construction site and to observe how far the workers obey the DOSH safety guideline in using PPE (Personal proactive equipment) .while perform work. The visit done will highlight the objective of this research.

1.5 Significance of study

Accidents was caused by unsafe act, unsafe condition or both .Accident don't just happen, and in order to improve the overall safety performance investigation need to be carry out in construction site. Through this research, comparative of actual application of PPE (Personal proactive equipment) in site and the actual guideline will be able to identify. To figure out the reason accident still occurs in construction site even with enforcement of PPE (Personal proactive equipment) among workers. From this study, advance precaution can be taken to lessen the numbers of accidents.

It can be focused to the parties that responsible for the safety on site. The entity that involve work in site must able to monitor the work and frequent basis as well know the relevant safety standard for the task being performed and entity must be able to control behavior means that entity must have the formal or informal authority direct the action of the workers

Meanwhile, safety awareness can be improved among parties that directly involve in construction site, so advance step can be taken to lessen the numbers of accident occurs in site.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The review of this research will be based on several topics which are found to be relevant and influence the outcome of this research. The scope figured in this review will include safety guideline of Dosh and actual practice by workers on site in perspective of PPE

The reason why workers fail to follow the proper safety instructions and method to solve this problem. According from previous research (Huang and Hinze, 2006) the safety in construction industry recorded to be one of the poorest even with the marked improvement in these recent years. Thus this industry also ranked among the most dangerous occupations accounting for a disproportionately percentage. By providing requisite systems, motivations and tools an organization can improve the safety. However, safety is implemented in reason to ensure the construction workers who perform the work on site indeed need to adopt or use adequate safety that related to equipment, tools and system for the provision and control of work environment and human behaviour. PPE is a key to personal safety at the work level and also as significant determining factors between safety and an accidents .Even though OSHA responsible for indicating the safety procedures and policies, which required the workers to wear PPE to decrease employee exposure to hazard.

In any construction process no matter how tight the enforcement of safety among workers but accidents will still occurs. There have been many theories that explain the cause of accident. Human error theories pointed worker as the main factor

of the accident. This approach as mentioned by Abdel Hamid studies the tendency of human to make error under various condition and situations, with the blame mostly fall on human (unsafe) characteristics only. But this theory does not blame the workers as the main problem of accidents, other factors such as design of workplace and task that do not consider worker limitation also take part as the reason why accidents happened (Abdel Hamid and Everett, 2000). In recent statistic released by Occupational Safety and health Administration (OSHA), percentage of workers wear the correct protection is only 64%

According to Ridley 99 percent of the accidents are caused by either unsafe act or unsafe condition or both. (Ridley, 1986). Even though there is presence of other theories but unsafe act which is means human error that directly refer to the workers attitude behavior or act are still the major reason why accident occurs in construction site even with the existence of safety guidelines.

2.2 Safety Management

Safety policy is defined as a published statement reflecting the organization's vision and mission in the relation to the management of health and safety matters (Griffith & Howarth, 2001). In the context of its business activities safety policy must establish the organization corporate philosophy regarding health and safety matters. According to kin and Bonaventura (2006) stated that in their study that safety policy is a written statement of principles and goals which can demonstrate top management commitment to ensure the safe working methods and environment at the construction site. Safety is also a relative freedom from danger, risk, or threat of harm, injury or loss of personnel property whether caused deliberately or by accident according to business dictionary.

As the foundation for a healthy effective safety management program, a company policy is a must. According to Dave Heberle (1998) a company's safety policy should address a number of points critical to safety management. First, employee safety must receive a high priority among all of the other managements concern, a managements believes that accidental injuries are preventable, and that worksite activities can go on,

day after day, week after week, month after month without accidents, all the necessary support to achieve an accident-free environment, including safe equipment and safe procedures will be provide by the company and also supply safety training to all workers so they can work in a safe manner. Next company management responsible for the development and the operation of the company's safety management program and the all the employees, hourly and salaried, must work safely and must follow regulatory safety laws and the regulations plus the company's safety rules and regulations.

Like many other Management activity Safety management consist of planning. Organizing, controlling and communications

2.3 Planning

Planning is a essential stages for Management success and component of the project, including safety. A well planned –operations include a series of deliberate steps where the Safety practice must forecast the needs of the safety department for the coming year.

Pat Perry (2003) affirmed that if CDM Regulations 1994 apply to the construction project, there must be construction Phase Health and Safety Plan before works start on site. For small project even if CDM does not apply because it too small, it is still a good idea to formulate a construction Phase Health and Safety Plan.

Established plans numerous as standard by which the practitioner can judge the safety program performance. It should involve the objective and the mission that the organization want to accomplish. Once the safety objective is established method to achieve objective can be laid out, then timetables and budget can be formulated.

2.4 Risk assessment

Risk assessment are required under the Management and Health and Safety at Work regulations 1999 and all employers are required to assess the risk to workers and other who may be affected by their undertaking. A suitable and sufficient Risk assessment should identify the significant risk arising out of the work, enable the

employer to identify and priorities the measures needed to be taken that all relevant statutory provision are complied with, be appropriate to the nature of the work. Remain in force for the duration of the work and be regularly reviewed.

A principle contractor should carry out Risk assessment for all work activities which employee undertake .Also a principle contractor should receive risk assessments for all the other contractor, sub-contractor and self-employed tradesmen working on the site. These will include details of how the risk from the hazard examples noise-induced hearing loss can be eliminated or reduced. Risk assessment need only identify significant risk involved in carrying out a work activity. Routine risk and everyday risk such as crossing the road to get to the employee car park need not be included .Where anything unusual or uncommon is to be undertaken on the site, a Risk Assessment will be essential.

2.5 Role of safety

Safety is a critical item on construction project for numerous reasons including protecting the welfare of employers, providing a safe work environment and controlling construction cost. With the process of preventing workers injuries and illness itself make the workers more efficient and effective with the project. Education and training are invented to prevent human error that may cause the accidents and to enable workers to perform repetitive task with skill (Paringga, 2010).Safety training is the most effectual tool to attenuate hazard since training can help improve workers skill and abilities to identify hazard. Training includes OSHA required safety information and the Pre-task planning goes into the actual work task risk and corrective action that will prevent the risk from exhibit on the jobsite. With the existence of safety training it can help the employee to prepare the work about to perform, present the job through demonstration with the detailed explanations, the workers able to get involve with the actual hands-on experience and employee able to do the work while still being available for questions and feedback as to the safety and quality of the work.

Safety management system has created the needed for the safety audit which is includes safety inspection. According to Nikolaos and Permana (2007) safety

inspection is one of the important safety practice based on the study they did in Indonesia. Safety inspection can maintain safe conditions and monitoring unsafe practice at workplace.

Discussion regarding to health and safety matters involving all the construction team gathering at workplace and do safety meetings on danger prediction as safety activities at construction site.

2.6 Statistic accidents in Malaysia

Based on the statistic, it was indicate that accident rate in Malaysia construction site is till high and shows that construction industry is one of the critical. DOSH occupational accidents statistics in 2014 and 2013 revealed construction industry was among top 3 sector that have high accidents occurs. In 2013 statistic constitute about 67 death,98 non-permanent disability (NPD),12 permanent disability(PD).Number of death increasing in 2014 with 72 peoples,94 non-permanent disability(NPD) and 6 permanent disability (PD)Record of Dosh also indicated there is a total of 187 construction worker died between years of 2011 and 2013.

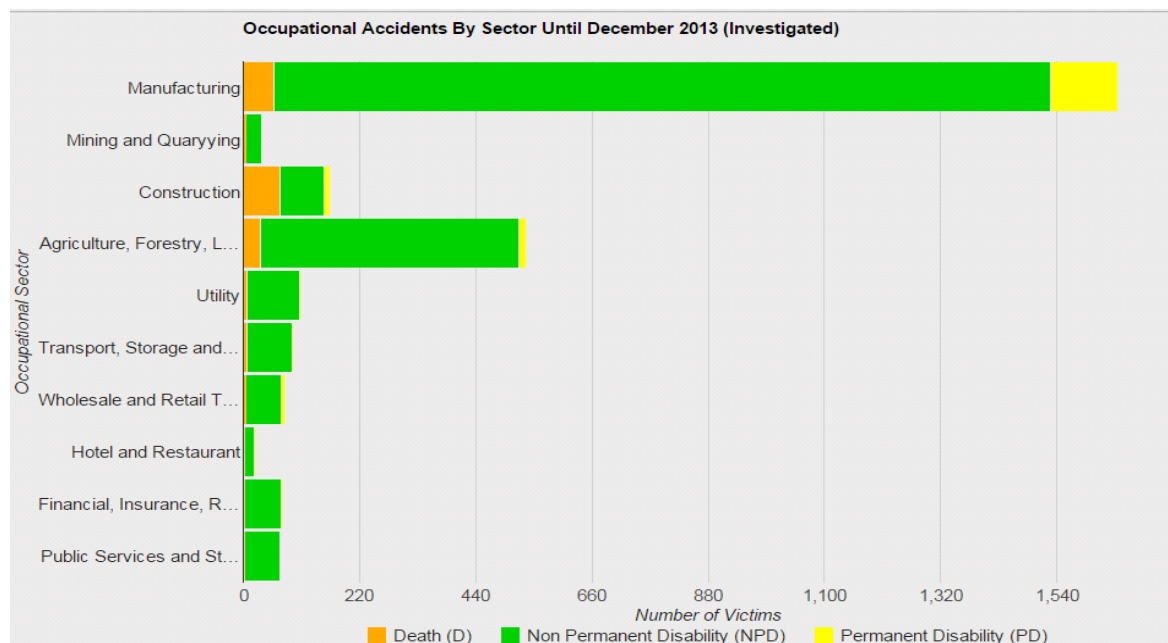


Figure 2.1: Statistic of Accidents in Malaysia by sector in 2013

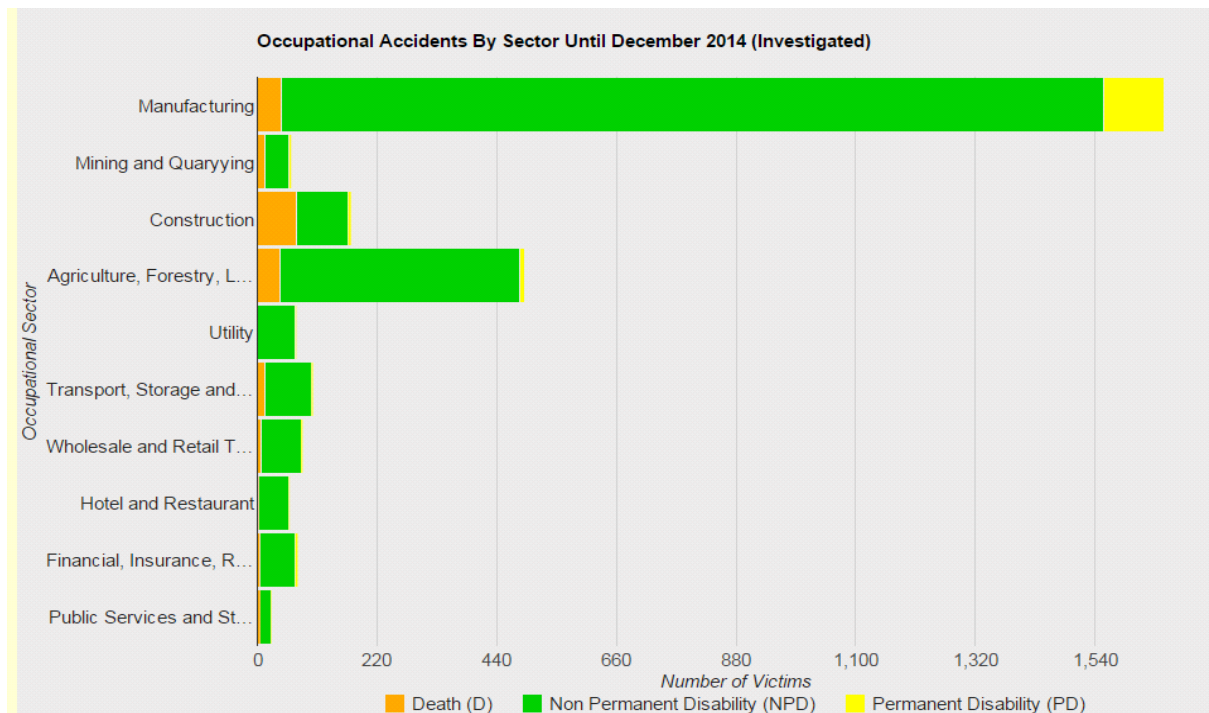


Figure 2.2: Statistic of Accidents in Malaysia by sector in 2014

Source: DOSH (2015)

2.7 Type of accidents

Death on the job has decreased over the years but they still occur. For example according to David L (2010) there are 10,400 works deaths in the United States and the cause is due to various reasons including those related to motor vehicles, falls, electric current, drowning, air transport, machinery, mechanical suffocations, poison and rail transport.

Over the years falls are the most frequent accidents that occurring in site thus gives the highest rate in fatalities and injuries. Construction fall accidents especially fall of person from height accidents is the major type of accident that commonly occurred in construction industry and it was mainly due to fall from platform, fall from scaffolds, fall from roofs, fall from ladders and also fall from aerial lifts (Huang and Hinzi, 2003).

Fall accidents in construction project have long been major problem and the prevention of accidents involving falls from height remains a high priority for the construction industry (Glasgow Coledoian University, 2015). Elbeltagi and Hegazy (2002) stated that the major cause of accidents in the construction is due to falls .Falls that can result in fatalities which include people falling from one level to another, people falling at the same level and pant and material falling. Following by struck by falling objects, stepping on objects, caught in between object and other type. These common types of accidents happen in low-rise building due to recklessness and complacency attitude in workers.

Motor vehicles accidents is category of accident that resulting from involving mechanically or electrically powered vehicles excluding rail vehicles that occurs on or off the road. Poisoning category divided into two sub categories. First, poisoning by gases and vapours caused by incomplete combustion or from carbon monoxide. Second is by solid and liquid that result from ingestion of drugs ,medicine ,recognized solid and liquid poisons, mushroom and shellfish .Drowning is include work-relate and nonwork-related drowning incidents, but excludes those associated with floods or other natural disaster.

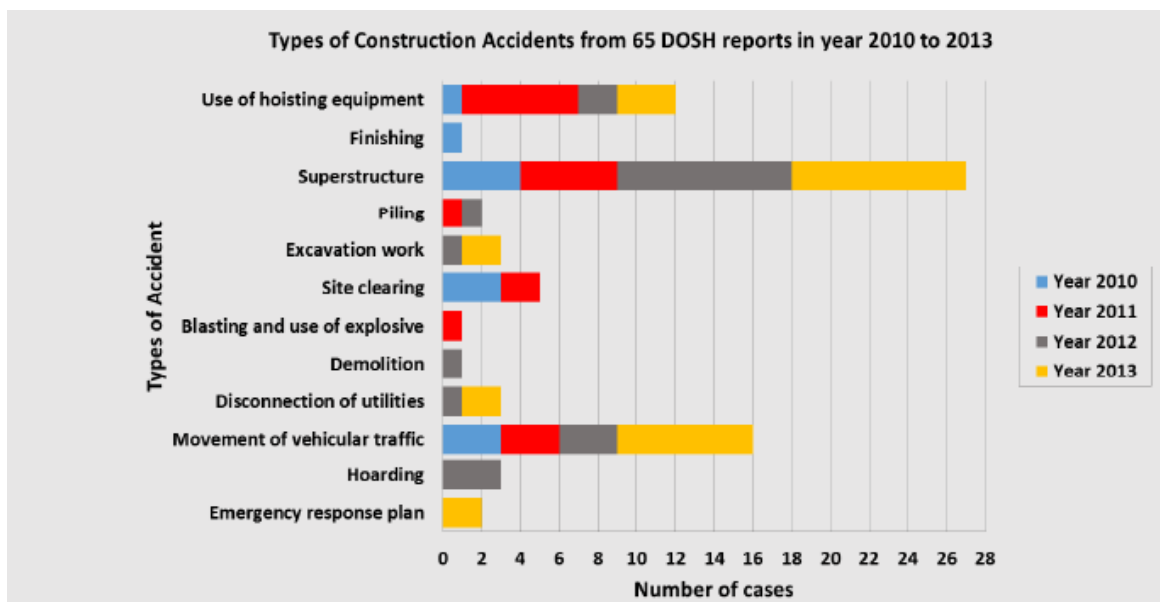


Figure 2.3: Statistics of accidents in Malaysia by types of accidents

	Date	Accident	Location
i.	21 Jan 2007	Fall from roof	Construction Site,Negeri Sembilan
ii.	12 Mar 2007	Fall from 7 th to 2 nd floor	Construction Site,Kuala Lumpur
iii.	28 Mar 2007	Fall of worker from platform of scaffolding	Construction Site,Melaka
iv.	02 Apr 2007	Fall from Height	Construction Site,Selangor
v.	14 Apr 2007	Fall from 6 th floor	Construction Site,Selangor
vi.	01 Jun 2007	Fall from 1 st floor	Construction Site,Selangor
vii.	20 Aug 2007	Fall from scaffolding	Construction Site,Negeri Sembilan
viii.	10 Oct 2007	Crushed to death by excavator	Logging Site,Sarawak

Figure 2.4: Statistics fall accidents in Malaysia by location

Source: DOSH (2015)

2.8 Cause of accidents in Malaysia

Accidents were classified into two main factors, which is human factor and physical factors. Tam et al (2004) stated that poor awareness from main leaders, lack of training ,lack of organization commitment, uncontrolled operation, lack of certified skill labor, lack of personal protective equipment (PPE),unsafe equipment, lack of technology and poor information flow.

Besides, According to David L.Geostch (2010) the most common factors that contribute to accidents are physical hazard, environmental hazard, human factor, lack of safety regulation and poor communication within or among workers. There are several theories of accidents causation that can explain why do accidents happen that can be used to predict or to prevent accidents.

2.9 THEORIES EXPLAIN ACCIDENTS

2.9.1 Domino Theory of accidents causation

Herbert W. Heinrich after studying 75,000 of reports on workplace accidents in 1920 concluded that 88% of workplace accidents are caused by unsafe act that committed by others fellow workers, 10% are caused by unsafe condition and 2% of workplace accident are unavoidable. He studied that laid the foundation for his Axioms of Industrial Safety and his theory of accidents causation which also known as domino theory. Heinrich theory has two central points. Injuries are caused by the proceeding factors and removal of the central factor an unsafe act or hazardous condition negates the action of the preceding factors and, in so doing, prevent accidents and injuries.

2.9.2 Human factor theory

These factors ultimately caused by human error .Overload, inappropriate respond and inappropriate activities are three main factors that lead to human error. Overboard is person capacity of such factors or workers ability, state of mind, training, physical condition and stress. For examples when a person capacity in any time is unbalance with load that person carrying at a given time. The person or the workers is responsible and added burdens due to environmental factors, internal factors and situational factors. Inappropriate activities when a workers perform task that they does not know how to do and inappropriate respond is when a workers respond to any situation that can cause hazard.

2.9.3 Accident/Incident theory

This theory is extension of the human factors theory and introduces new elements such as ergonomics traps, the decision to err, and system failure .A variety pressure such as peer pressure, deadlines and budget factors can cause a person decide to behave in unsafe manner. Thus, syndrome "it won't happen to me" also can influence the decision. System failure is important component since it shows potential the potential for a casual relationship between management decision and safety. Moreover it also established management's role in accidents prevention.

2.9.4 Epidemiological theory

Epidemiological theory is a study of casual relationship between environmental factors and disease. Since others theories mostly focus on accidents and resulting injuries Epidemiological encompasses the issues of industrial hygiene that concern environmental factors that can result on disease, sickness or other forms of impaired health. The key components are predisposition characteristic and situational characteristics. These characteristic taken together can result in or prevent condition that may result in accidents

There are vary root cause of construction accidents. Table below listed the root cause, including description and example:

Root cause	Description	Example
Lack of proper training	An employee was not properly trained in recognizing and avoiding job hazards.	A new employee is sent up to work on a sloped roof without being trained on the proper use of the fall restraint system and ties off to a deficient anchor.
Deficient enforcement of safety	An employee's supervisor (or other individual with safety oversight responsibilities) knew that prescribed methods for avoiding hazards were not being followed, but neglected to enforce safety standards.	A foreman ignores an employee who repeatedly does not use the fall restraint system provided him/her.
Safe equipment not provided	An employer does not provide an employee with equipment necessary to minimize hazards.	A foreman does not provide his/her crew members with proper fall restraint systems when such systems are needed.
Unsafe methods or sequencing	The normal sequencing of construction tasks does not occur, resulting in a task being inherently more hazardous than is typical.	A general contractor insists that a carpenter start framing before the foundation is properly backfilled.
Unsafe site conditions	The site is inherently more hazardous than are typical construction sites.	Poor housekeeping, a broken ladder, or a structurally deficient work platform
Not using provided safety equipment	An employee is provided with proper safety equipment but does not use it properly or does not use it at all.	A trained and experienced tradesperson who has been provided with an appropriate fall restraint system refuses to use it.
Poor attitude toward safety	An employee may have been properly trained, but does not properly avoid job hazards due to a "tough-guy" mentality, laziness, or a perception that prescribed methods would unduly slow job progress.	A tradesperson who has been trained on the proper use of ladders refuses to face the ladder when walking down it.
Isolated, sudden deviation from prescribed behavior	A normally competent and safety-conscious employee suddenly and unforeseeably performs an unsafe act due to fatigue, preoccupation, or likewise.	A trained and experienced tradesperson who has been using a proper fall restraint system suddenly forgets to tie himself/herself off.

Figure 2.5: Root cause and descriptions of accidents happen

Source: Rahim (2013)

2.10 Safety precaution

According to Rosli Ahmad (2008), good safety program would certainly help in reducing injuries at construction site and also to minimize construction cost, increase productivity and profitability and more importantly it could save lives of workers and consequently contribute positively to the construction industry and whole nation. HSW act stated that the employer is to provide such information as is necessary to ensure the health and safety at work of his employees. The primary medium for making safety information available is print. Company can provide (1) safety handbook that contain safety policy statement, general introduction, employer's responsibility. (2) Company safety literature for managers. Managers represent employer to all staff necessary to ensure their safety. (3) Safety and health enforcement and legislation to enhance capabilities of enforcement agencies and review existing regulations.(4)Provide safety and health training and education for workers

2.11 Personal protective equipment (PPE)

The personal protective equipment (PPE) is define as all equipment including clothing affording protection against the weather which is means to be worn or held by a person who performing work at site ad which to protect against risks to their health or safety, for example -gloves, high-visibility clothing, safety helmets, eye protection, footwear and safety harnesses. Under the management of Health and Safety at work Regulation 1999 employers are needed to carry out workplace risk assessment enabling the employers to choose the most appropriate means of reducing any risk to an acceptable level and minimize or eliminate risk as close as possible from the source of risk and protecting others workers in the site.

Before entering the construction site the workers or employees were trained about PPE in aspects of when is PPE necessary to be used, the proper use of PPE, what kind of PPE is needed in performing certain type of work, the limitation of PPE in providing protection, how to put on, adjust, wear and take off PPE in safest way and lastly the workers was also required to know how to do proper maintenance procedures for PPE.

Indicated by Dorji and Hadikusumo (2008). Many workers refuse to wear PPE with various reasons such as feel uncomfortable with the gears while performing their job at site and consider it as an obstacle to their work output. Besides The International Labour organization (1996) revealed that some of the workers felt uncomfortable while wearing any types of PPE and. it directly decreases their work performance. The personal Protective (PPE) at work regulations 1992 place responsibilities on employers to implement certain basic health and safety requirements regarding the provision and use of PPE. The radio communication Agency is committed to effectively applying them. Employers should use, maintained and cleaned the PPE provided with accordance with the training, instruction information received with sense of responsibility.

2.12 TYPE OF PPE

2.12.1 Goggles and Face Shield

Worn every time performing work which can avoid foreign objects getting into the eye such as during welding, cutting, grinding, nailing or when dealing with concrete or harmful chemicals or when exposed to flying particles. Besides goggles and face shield were choose base on anticipated hazards and worn when exposed to any electrical hazard including work on energized.

For eye protection equipment and protective measures must meet the following specification or requirements which are provide adequate and protection against the particular hazards for which they designed and importantly it must be comfortable for the workers to wear.